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ART. XVIII.—*Victorian Lower Pliocene Bryozoa. Part I.*

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(With Plate XII.)

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Introduction.

The Victorian Lower Pliocene Bryozoa, probably because of their comparative rarity and the overwhelming variety and extraordinary preservation of Victorian Lower Tertiary forms, have received but passing mention from previous workers. The Bryozoa form, however, a definite constituent of Lower Pliocene faunas and their stratigraphical application in borings has scarcely been utilized because of the lack of systematic treatment of the Lower Pliocene species. The present contribution lists the forms in an extensive series of sievings collected from the classic Macdonald's locality on Muddy Creek, Hamilton, during January, 1934.

The author (1933) stated that the Catenicellidae had not been found in the Lower Pliocene, his material being then confined to an extensive series of washings from Beaumaris, the upper section of No. 7 bore, Parish of Glencoe, and a small amount of material from Macdonald's. Further search has revealed their occurrence at the present locality, and it is hoped that further work on the Lower Pliocene Catenicellidae will materially assist the elucidation of the phylogeny of this interesting southern Australian group.

Previous Literature.

The earliest record of Victorian Lower Pliocene Bryozoa known to the author is that of Maplestone (1902) who records the occurrence of "*Schizoporella*" *flabellata* Mapl., 1902, from Jemmy's Point (Lakes Entrance) and the Reeves River. Livingstone (1924) has shown this form to be an early zoarial growth stage of the Recent *Parmularia obliqua* (Macgillivray). The former author (1904, i.) later records several species of *Sclenaria* from Jemmy's Point and *S. petaloïdes* from Beaumaris. It is doubtful whether the species recorded from Beaumaris by Maplestone in the latter paper and in his tabulated list (1904, ii.) were obtained from the series above or below the remanié nodule bed (Lower Pliocene and Lower Miocene respectively) at this locality.

Chapman (1916) has recorded Bryozoa from mixed Miocene-Pliocene faunas in the Mallee bores, and later (1928) a fairly extensive series consisting mainly of Cellariidae and "*Lunulites*" from the Lower Pliocene (Kalimnan) of the Sorrento bore.

List of Species.

<i>Otionella grandipora</i> , sp. nov. P.	<i>Tubucellaria hirsuta</i> (Lamx.). P-R.
<i>Arachnopusia acanthoceros</i> (MacG.). P-R.	<i>T. cercoides gracilis</i> Canu and Bassler. P-R.
<i>A. terminata</i> (Waters). M-P.	<i>Relepora porcellana</i> MacG. M-R.
<i>Caleschara denticulata</i> (MacG.). M-R.	<i>Adeconellopsis australis</i> MacG. P-R.
? <i>Selenaria punctata</i> T.-Woods.	<i>Vittalicella elegans</i> (Busk). M-R.
<i>S. maculata</i> (Busk). M-R.	<i>V. gracilentata</i> (MacG.). P-R.
<i>Steganoporella magnilabris</i> (Busk). M-R.	<i>V. hannafordi</i> (MacG.). M-R.
<i>Cellaria australis</i> MacG. M-R.	<i>Cornuticella perforata</i> (Busk). P-R.
<i>Cellaria setigera</i> Pergens. P-R.	<i>Pterocella alata</i> (Wyv.-Th.). M-R.
<i>Caberca grandis</i> Hincks. M-R.	<i>Claviporella aurita</i> (Busk.) P-R.
<i>Schizoporella conservata</i> Waters. M-R.	
<i>Parmularia obliqua</i> (MacG.). P-R.	

M = Lower Miocene, P = Lower Pliocene, R = Recent.

Aspect of the Faunal Assemblage.

The abundance of *Lunulites*-form zoaria in this deposit is the most striking feature of the bryozoan fauna. Darteville (1933) notes that "*Lunulites*" are common on sandy bottoms subject to the influence of tides and currents, thus indicating moderately shallow-water conditions. The occurrence of abundant Catenicellidae also points to a similar bathymetric facies, the group, from available records, apparently flourishing at depths of five to forty fathoms and forming, together with *Cellaria setigera*, a conspicuous constituent of storm débris around the Victorian coast.

The fauna has an essentially Recent character, and the gap in the marine history of the Muddy Creek area from Lower Miocene to Lower Pliocene represented by the remanié nodule bed, accounts for the extinction of a large proportion of the Lower Miocene fauna of the underlying series represented at Clifton Bank. Many of the forms are recorded as fossil for the first time.

Systematics and Distribution.

OTIONELLA GRANDIPORA, sp. nov.

(Pl. XII., Figs. 1, 2.)

Description.—Zoarium discoidal, slightly convex. The zooecia are roughly polygonal with the distal raised margins rounded. The opesium is oval and slightly broader at the proximal end, the free edge of the finely papillose cryptocyst being minutely denticulate. The asymmetrical interzooecial vibracula occur in the angle between the distal rims of neighbouring zooecia.

The radial ribs of the slightly concave inner face are minutely papillose and slightly convex, perforated by a longitudinal row of scattered pores and separated by narrow raised ridges.

Dimensions.—Zecarium, diameter 3-6 mm.; zoecium, length 0.43 mm., width 0.37; opesium, length 0.27, width 0.18; vibraculum, length 0.20, width 0.08.

Observations.—This species appears to belong to the genus *Otionella* Canu and Bassler (1920), but lacks the raised "collar" bordering the opesium, which feature seems to be a characteristic of the genus. The species is distinguished from the North American Tertiary forms by its larger dimensions and the greater proportionate area of the opesium.

Distribution.—Lower Pliocene: Macdonald's.

ARACHNOPUSIA ACANTHOCEROS (Macgillivray, 1887).

Cribrilina acanthoceros Macgillivray, 1887, p. 68, pl. ii., fig. 4.

Arachnopusia acanthoceros (Macgillivray), Livingstone, 1924, p. 204.

Distribution.—Recent: Port Phillip Heads, Portland (Macgillivray).

Lower Pliocene: Macdonald's.

ARACHNOPUSIA TERMINATA (Waters, 1881).

Cribrilina terminata Waters, 1881, p. 326, pl. xvii., fig. 68.

Arachnopusia terminata (Waters), Canu and Bassler, 1920, p. 313.

Observations.—A single specimen of this species agreeing in minute detail with the zoecia figured by Waters (1881) was found encrusting a shell fragment. This is one of the few extinct species common to both the upper and lower Tertiary of Victoria.

Dimensions.—Zoecium, length 0.80 mm., width 0.58; aperture, width 0.23, height 0.15.

Distribution.—Lower Pliocene: Macdonald's.

Lower Miocene: *vide* Maplestone (1904, ii.) and add: Sorrento bore, 1,320 feet.

CALESCHARA DENTICULATA (Macgillivray, 1869).

Eschara denticulata Macgillivray, 1869, p. 138.

Caleschara denticulata (Macgillivray), 1895, p. 51, pl. vi., figs. 8, 9. Livingstone, 1928, p. 112, text-fig. 31.

Observations.—This form is abundant at Macdonald's, occurring as bilaminate foliaceous fragments. The Lower Miocene specimens are generally of the type described as var. *tenuis* by Busk (1884), but whether it should be separated as a distinct species is doubtful. The lower Tertiary series has a deeper-water facies than that represented by the Lower Pliocene, and it is possible that the narrow bilaminate fronds with their more elongate zoecia constitute a growth variation correlated with the more equable conditions prevailing in deeper water than in the littoral zone within the limits of wave action, where zoarial

growth would tend to dominate in the horizontal plane rather than in the vertical plane. Significant in this direction is the fact that var. *tenuis* was recorded from 38 fathoms, while Macgillivray's foliaceous specimens were obtained from storm débris and tidal scour.

Distribution.—Recent: Queenscliff, Mornington, Warrnambool (Macgillivray); off East Moncoeur Is. (Bass Str.) at 38 faths., Curtis Is. (Bass Str.) (Busk); South Australia 14-40 faths. (details, Livingstone, 1928).

Lower Pliocene: Macdonald's.

Lower Miocene: *vide* Maplestone (1904, ii.) and add: Batesford Tunnel marl, Curlewis marl, Forsyth's (below remanié nodule bed) on Grange Burn (Hamilton).

?SELENARIA PUNCTATA Tenison-Woods, 1880.

Selenaria punctata Tenison-Woods, 1880, p. 9, pl. ii., figs. 8 a-c.

Dimensions.—Zooecium, length 0.32 mm., width 0.25; opesium, diameter 0.08.

Observations.—A very much abraded zoarium was found with a single zooecium intact. The zooecium has the two opesiules characteristic of the above species, but its zoocial dimensions are greater than those given by Maplestone (1904, i.) and less than those of *S. magnipunctata* Maplestone, 1904, which is a lower Tertiary form. It is doubtfully referred here to the Recent species, but its relationship cannot be fully ascertained without further specimens.

SELENARIA MACULATA (Busk, 1852).

Lunulites maculata Busk, 1852, i., pl. i., figs. 15, 16.

Selenaria maculata (Busk), Macgillivray, 1895, p. 47, pl. vii., figs. 5-7.

Distribution.—Recent: Bass Strait (Busk); Holborn Is. (Queensland); Barnard Is. (N.E. Aust.) at 10 faths.

Lower Pliocene: Macdonald's, Sorrento bore, 660 ft.-730 ft.

Lower Miocene: *vide* Maplestone (1904, ii.) and add: Batesford Tunnel marl, Curlewis marl, quarry on Thompson's Ck. $\frac{1}{4}$ ml. E. of Torquay Road, Sorrento bore, to 1,525 ft.

STEGANOPORELLA MAGNILABRIS (Busk, 1854).

Membranipora magnilabris Busk, 1854, p. 62, pl. lxx., fig. 4.

Steganoporella magnilabris (Busk), Canu and Bassler, 1929, p. 144, pl. xv., figs. 1, 2.

Observations.—This well-known, widely-distributed species is represented throughout the greater part of the Victorian Tertiary sequence. Regarding its bathymetric occurrence, Canu and Bassler (1929) have stated that "Its presence in the fossils does not have a great bathymetric significance." A single abraded specimen with zooecia identical with Victorian Recent specimens

was obtained. Contrary to the general habit of this species, the specimen is unilamellar and apparently had been encrusting an irregular substratum.

Distribution.—Recent: Atlantic Ocean 8-182 faths. (details, Canu and Bassler, 1928); Indo-Pacific Region 2-230 faths. (details, Canu and Bassler, 1928, 1929). Southern Australia: Bass Str., Lakes Entrance; Beachport 40 faths., 7 mls. S.W. Newland Head (Encounter Bay) 20 faths., 3 mls. S. Tunk Hds. 16 faths., Port Wallaroo 15 faths. (Livingstone).

Pliocene: Caloosahatchee marl (Florida).

Lower Pliocene: Macdonald's.

Miocene: Choctawhatchee marl (Florida).

Lower Miocene: *vide* Maplestone (1904, ii.) and add: Largon Ck. off Toorloo Arm (8 mls. E. of Lakes Entrance); Sorrento bore, 1,693 ft. (Chapman).

CELLARIA AUSTRALIS Macgillivray, 1880.

Cellaria fistulosa var. *australis* Macgillivray, 1880, dec. v., p. 48, pl. 49, fig. 1.

Cellaria australis Macgillivray, 1895, p. 29, pl. iii., fig. 19.

Distribution.—Recent: Bass Str. cable, Queenscliff, Portland (Vic.); off Port Morowie 14 faths. (South Aust.).

Lower Pliocene: Macdonald's, Glencoe No. 7 bore 160 ft.-200 ft., Sorrento bore 324 ft.-719 ft.

Lower Miocene: *vide* Maplestone (1904, ii.) and add: Sorrento bore, to 1,608 ft.

CELLARIA SETIGERA Pergens, 1887.

Salicornaria hirsuta Macgillivray, 1869, p. 128.

Cellaria hirsuta Macgillivray, 1880 (*non* Lamouroux, 1816 = *Tubucellaria hirsuta*), dec. v., p. 48, pl. 49, fig. 2.

Cellaria setigera Desmarest and Lesueur MS., 1829, pl. viii., fig. 6. Pergens, 1887, p. 89.

Observations.—This species is readily recognized in the fossil state by the perforations at the bases of the zooecia, indicating the points of attachment of the numerous chitinous, filiform appendages which suggested both the trivial names attached to this form.

Distribution.—Recent: Western Port, Torquay, Queenscliff, Portland, Bass Str. cable (Vic.).

Lower Pliocene: Macdonald's.

CABEREA GRANDIS Hincks, 1881.

(Pl. XII., Fig. 3.)

Caberea grandis Hincks, 1881, p. 50, pl. iii., fig. 4.

Observations.—Several very much abraded fragments referable to this species were found. The characters of the zooecia are made out with great difficulty, but the dorsal view of the

vibracular grooves is quite distinctive. This species was recorded from the lower Tertiary of Victoria by Macgillivray (1895), who remarks that none of his specimens showed the large vicarious avicularia usually seen in the Recent forms. Maplestone, however, has written a note in his copy of the "Monograph" stating that he had seen specimens with that feature.

Distribution.—Recent: Bass Strait cable, Western Port, Lakes Entrance, Port Phillip Heads (Vic.); 22 mls. E. of Port Jackson at 80 faths., Darnley Is. (Torres Str.) at 10-30 faths.

Lower Pliocene: Sorrento bore 726 ft., Macdonald's.

Lower Miocene: *vide* Maplestone (1904, ii).

SCHIZOPORELLA CONSERVATA Waters, 1881.

(Pl. XII., Fig. 4.)

Schizoporella conservata Waters, 1881, p. 340, pl. xviii., fig. 81.
Hincks, 1882, p. 165, pl. vii., fig. 2. Maplestone, 1904, ii., p. 207.

Schizoporella insignis Macgillivray (*non* Hincks, 1881), 1883, p. 132, pl. ii., fig. 11. Hincks, 1884, p. 281.

Schizoporella daedala Macgillivray, 1887, dec. xiv., p. 146, pl. 138, fig. 4; *idem*, 1895, p. 84, pl. xi., fig. 15. Maplestone, 1904, ii., p. 207.

Observations.—Hincks (1884) pointed out that *S. insignis* MacG. (1883) could be referred to *S. conservata* Waters, 1881. Macgillivray (1887) denied this (misquoting Waters' species as "*controversa*") and changed the trivial name to *daedala*, since his original name was preoccupied by Hincks (1881). Later (1895) Macgillivray admitted the conspecificity of the two forms and described the species under the name "*daedala*," ignoring the priority of Waters' name "*conservata*." Maplestone perhaps regarded them as separate species, but may have accidentally listed them separately during the laborious mechanical assemblage of his catalogue (1904, ii.).

Distribution.—Recent: Off Port Phillip Heads (Macgillivray).

Lower Pliocene: Macdonald's.

Lower Miocene: *vide* Maplestone (1904, ii.).

PARMULARIA OBLIQUA (Macgillivray, 1869).

(Pl. XII., Fig. 5.)

Eschara obliqua Macgillivray, 1869, p. 137.

Schizoporella flabellata Maplestone, 1902, p. 68, pl. vii., figs. 10, 10A.

Parmularia obliqua (Macgillivray). Livingstone, 1924, p. 190, pl. xxiii., figs. 1, 2, pl. xxv., fig. 1, pl. xxvi., text-fig. 1.

Distribution.—Recent: Eastern and southern Australia at 5-100 fathoms (details, Livingstone, 1924, 1928).

Lower Pliocene: Jemmy's Point, Reeves River (Victoria) (Maplestone); Macdonald's.

TUBUCELLARIA HIRSUTA (Lamouroux, 1816).

(Pl. XII., Fig. 6.)

Cellaria hirsuta Lamouroux, 1816 (*non Cellaria hirsuta* (MacG., 1869) = *C. setigera* Pergens, 1887), p. 126, pl. ii., fig. 4.*Tubucellaria hirsuta* (Lamouroux), Livingstone, 1928, p. 117.

Observations.—This species is readily distinguished in the fossil state by its similar zooecial arrangement to that of the genus *Tetraplaria* Tenison-Woods, and by the presence of the pits on either side of the peristome marking the insertion of the jointed, filiform, chitinous processes characteristic of this species. The fossil specimens are generally much worn, the peristome being usually completely abraded away. It is essentially a shallow-water form and is common around the Victorian coast amongst storm débris.

Distribution.—Recent: Queenscliff, Western Port, Cape Otway, Portland (Vic.) (Macgillivray); off Two Sisters' Is., Bass Str. cable (J. Gabriel coll.). South Australia: 12 mls. S.E. by S. from Newland Head (Encounter Bay) at 24 faths. (Livingstone).

Lower Pliocene: Macdonald's.

TUBUCELLARIA CEREOIDES GRACILIS Canu and Bassler, 1929.

(Pl. XII., Fig. 7.)

Tubucellaria cercoides (*non* Ellis and Solander), Macgillivray, 1885, p. 107, pl. i., fig. 4.*Tubucellaria cercoides gracilis* Canu and Bassler, 1929, p. 355, pl. xliv., figs. 1, 2.

Observations.—The Lower Pliocene specimens agree with the Philippine specimens of Canu and Bassler (1929) in the more proximal position of the ascopore and the dimensions of the zooecia. Macgillivray's specimens from Port Phillip Heads also show these features, the typical *T. cercoides* (Ell. and Sol.) from Naples having the ascopore situated close to the peristome.

Distribution.—Recent: Port Phillip Heads (Macgillivray); various localities in the Philippine Is. at depths of 20-240 faths. (Canu and Bassler).

Lower Pliocene: Macdonald's.

RETEPORA PORCELLANA Macgillivray, 1869.

Retepora porcellana Macgillivray, 1869, p. 140; *idem*, 1895, p. 115, pl. xv., fig. 15.

Distribution.—Recent: Port Phillip Heads.

Lower Pliocene: Macdonald's.

Lower Miocene: *vide* Maplestone (1904, ii.) and add: Quarry on Thompson's Creek $\frac{1}{4}$ ml. E. of Torquay Road.

ADEONELLOPSIS AUSTRALIS Macgillivray, 1886.

Adeonellopsis australis Macgillivray, 1886, p. 134, pl. ii., figs. 2, 3.

Observations.—This species occurs abundantly in the deposit as abraded bilaminate fragments. The upwardly-directed avicularium and the three or four stellate ascospores are typical of the species.

Distribution.—Recent: Port Phillip Heads (Macgillivray).

Lower Pliocene: Macdonald's.

VITTATICELLA ELEGANS (Busk, 1852).

Catenicella elegans Busk, 1852, i., p. 361, pl. i., fig. 2.

Vittaticella elegans (Busk), Stach, 1934, ii., p. 19, pl. iii., figs. 1-4.

Distribution.—Recent: *vide* Stach (1934, ii.).

Lower Pliocene: Macdonald's.

Lower Miocene: Forsyth's (below remanié nodule bed) on Grange Burn (Hamilton).

VITTATICELLA GRACILENTA (Macgillivray, 1885).

(Pl. XII., Figs. 8, 9.)

Catenicella gracilentata Macgillivray, 1885, p. 106, pl. i., fig. 3.

Vittaticella gracilentata (Macgillivray), Maplestone, 1901, p. 202.

Description.—Zoocium elongate, subrectangular, tapering slightly at base; greatest width, at level of scapular compartments, equals one-third length of zoocium.

Proximal rim, equalling more than one-half width of zoocium, situated one-fifth of distance proximally from distal connecting-tube aperture. Aperture subcircular, transverse, extends two-thirds distance from proximal rim to distal connecting-tube aperture.

Scapular compartments, at level of distal half of aperture, face obliquely laterally; infrascapular compartments situated at level of proximal half of aperture; suprascapular compartments face obliquely forward and upward. The narrow vittae equalling four-fifths length of zoocium, face entirely laterally and have a single row of about twelve septulae.

Dorsal surface regularly convex. Axis of daughter zoocium inclined at about 35° to that of mother zoocium. Macgillivray (1885) notes that the ovicell has a central, smooth, longitudinally-elongate quadrate area.

Dimensions.—Zoocium from Macdonald's: Zoocium, length 0.75 mm., width 0.32; aperture, diameter 0.13; vittae, length 0.45. Recent zoocium from off Shoalhaven: Zoocium, length 0.87, width 0.30; aperture, diameter 0.14; vittae, length 0.51.

Observations.—The single fossil zoocium found has a portion of the proximal end broken off, thus accounting for the difference in the dimensions of the two zoocia recorded above.

No additional record of this species is known since 1885. It is readily distinguished by its extreme slenderness and long lateral vittae. The zoarium, seen macroscopically, has an etiolated appearance quite distinct from zoaria of the majority of the Catenicellidae. It may here be noted that the angle between the axes of the zooecia of a geminate pair is a fairly constant character of most species of the Catenicellidae and rarely varies more than 10° . It often gives a characteristic macroscopic feature enabling zoaria to be fairly accurately sorted specifically from bulk samples.

Distribution.—Recent: Port Phillip Heads (Macgillivray); Western Port (Vic.), off Eden and off Shoalhaven (N.S.W.) (J. Gabriel coll.).

Lower Pliocene: Macdonald's.

VITTATICELLA HANNAFORDI (Macgillivray, 1869).

Catenicella hannaforði Macgillivray, 1869, p. 127.

Vittaticella hannaforði (Macgillivray), Stach, 1933, p. 97.

Distribution.—*Vide* Stach (1933) and add, Lower Pliocene: Macdonald's.

CORNU TICELLA PERFORATA (Busk, 1852).

Catenicella perforata Busk, 1852, ii., p. 10, pl. viii., figs. 1, 2.

Vittaticella perforata (Busk), Maplestone, 1901, p. 202.

Catenaria perforata (Busk), Levinsen, 1909, p. 219.

Description.—Zooecium elongate-oval in outline; greatest width, at level of scapular compartments, equals about one-half length of zooecium.

Proximal rim, one-third width of zooecium in length, situated one-third distance proximally from distal connecting-tube aperture. The aperture is longitudinally oval, extending two-thirds of distance from proximal rim to distal connecting-tube aperture.

Scapular compartments, extending from level of proximal rim almost to summit of zooecium, face directly laterally and have one or more rounded uncalcified areas at their bases; infrascapular compartments reduced in extent; suprascapular compartments face upward. The narrow vittae, with a single row of seven to ten septulae, face directly laterally and equal two-thirds length of zooecium. The frontal has sparsely-scattered fine perforations.

Dorsal surface regularly convex, depressed behind scapular compartments. Axis of daughter zooecium inclined at about 45° to that of mother zooecium.

The smooth terminal ovicell, pertaining to the mother zooecium of a geminate pair, is pyriform and has a median longitudinal raised ridge.

Dimensions.—Recent zoecium from Torquay (Vic.): Zoecium, length 0.42 mm., width 0.26; aperture, diameter 0.09; vittae, length 0.23. Zoecium from Macdonald's: Zoecium, length 0.40, width 0.22; aperture, diameter 0.09; vittae, length 0.21.

Observations.—The position of the ovicell, noted by many authors, places this species in the genus *Cornuticella* Canu and Bassler, 1927, which appears to be further characterized by the laterally-directed vittae.

This species is readily recognized, in the absence of the ovicell, by the uncalcified areas at the bases of the scapular compartments and the narrow, laterally-directed vittae with a single row of seven to ten septulae.

C. perforata is abundant on the Victorian coast and this constitutes its initial record as a fossil.

Distribution.—Recent: Port Phillip Heads, Western Port, Torquay, Apollo Bay (Vic.); off Launceston and Devonport, Circular Head (Tas.), off Montagu Is. 50 faths. (N.S.W.) (Aust. Mus. coll.); St. Vincent Gulf (Sth. Aust. Mus. coll.); 10 mls. off Cape van Diemen at 50 faths., Three Kings' Is. at 65 faths. (New Zealand) (Livingstone).

Lower Pliocene: Macdonald's.

PTEROCELLA ALATA (Wyville-Thomson, 1858).

Catenicella alata Wyville-Thomson, 1858, p. 137, pl. xiii., fig. 4.

Pterocella alata (Wyv.-Th.), Levinsen, 1909, p. 246, pl. xii., figs. 6 a-b, pl. xxi., fig. 4A. Stach, 1934, i., p. 17, text-figs. 1 a-c.

Distribution. — Recent: Western Port, Torquay, Lakes Entrance, Warrnambool, Queenscliff (Vic.); New Plymouth at 8 faths. (New Zealand); off Launceston and Devonport (Tas.) (Aust. Mus. coll.).

Lower Pliocene: Macdonald's.

Lower Miocene: *vide* Maplestone (1904, ii.) and add: Glencoe No. 7 bore 580 ft., 650 ft., 790 ft., under railway bridge over Glenelg River at Dartmoor, Altona Bay coal shaft, Flinders, Nth. side of Armstrong's Ck. 10 chns. E. of Torquay Road, beach cliff at Ocean Grove, Batesford Tunnel marl, Prowse's marl pit (2 mls. W. of Mt. Moriac), Cochran's marl pit (near Ceres), Hamilton bore 80 ft.-85 ft.

CLAVIPORELLA AURITA (Busk, 1852).

Catenicella aurita Busk, 1852, ii., p. 8, pl. iv., figs. 1-3.

Claviporella aurita (Busk), Levinsen, 1909, p. 243, pl. xx., figs. 10 a-b.

Distribution.—Recent: Apollo Bay, Torquay, Lakes Entrance, Port Phillip Heads, Lorne, Western Port (Vic.); Encounter Bay, Port Elliot (South Aust. Mus. coll.); off Cape Maria van Diemen (New Zealand).

Lower Pliocene: Macdonald's.

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Explanation of Plate XII.

- Fig. 1. *Otionella grandipora*, sp. nov. Frontal view of holotype. × 20. Macdonald's. Nat. Mus. Coll., No. 14002.
- Fig. 2. *O. grandipora*, sp. nov. View of inner face of holotype. × 20. Macdonald's. Nat. Mus. Coll., No. 14002.
- Fig. 3. *Caberca grandis* Hincks. Dorsal view of plesiotype. × 20. Macdonald's. Nat. Mus. Coll., No. 14003.
- Fig. 4. *Schizoporella conservata* Waters. Frontal view of plesiotype. × 20. Macdonald's. Nat. Mus. Coll., No. 14004.
- Fig. 5. *Parmularia obliqua* (MacG.). Frontal view of plesiotype. × 20. Macdonald's. Nat. Mus. Coll., No. 14005.
- Fig. 6. *Tubucellaria hirsuta* (Lamx.). Fragment of internode showing zooeical detail. × 20. Macdonald's. Nat. Mus. Coll., 14006.
- Fig. 7. *Tubucellaria cereoides gracilis* Canu and Bassler. Fragment of internode showing zooeical detail. × 20. Macdonald's. Nat. Mus. Coll., No. 14007.
- Fig. 8. *Vittaticella gracilentia* (MacG.). Frontal view of single zoecium. × 40. Macdonald's. Nat. Mus. Coll., No. 14008.
- Fig. 9. *V. gracilentia* (MacG.). Frontal view of single recent zoecium. × 40. Off Shoalhaven (N.S.W.).